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13. ABSTRACT (Maximum 200 words)

This report contains information on internships and summer study programs in which the ONR NERT students participated during Summer 1999. The report also contains details on the 1999-2000 undergraduate research teams and a schedule of activities for Fall 1999.

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N.E.R.T.

Nurturing ECSU Research Talent
Elizabeth City State University

SUMMER 1999 RESEARCH ABSTRACTS ...

Three - Dimensional Battlefield Simulation of Realtime Kosovo

Researcher: Donald Charity
Mentor: Dr. Rob King, ONR-NRL

With the recent Kosovo crisis, the project assigned for research was a Three - Dimensional battlefield simulation of realtime Kosovo. This project when completed will be used for demonstrations at NRL's Virtual Reality Lab. The tools used to complete this project was MultiGen II, a realtime 3D modeling software used to generate the terrain, ARC Digitized Raster Graphics, sattilite collected images of the Kosovo terrain, DTED Digital Terrain Elevation Data on CD-ROM, along with several other application programs used to generate the desired terrain for viewing. Inside MultiGen II the three types of generation methods used were Delaunay database (TIN) Trianglar Irregular Network, The Polymesh database and CAT (Continuous Adaptive Terrain). This type of terrain generation focuses on the LOD (Level of Detail) problems generated by the Polymesh and the Delaunay database. Each terrain generator has its own GUI (Graphical User Interface) controls which allows the user to choose how the final terrain should look. The purpose of the research was to figure out which terrain is best suited to areas of interest by the military; to give accurate data feedbacks of elevation and viewpoints; to give excellent demos to visting officals and other researchers in this area; and to support virtual reality strategic planning.

Virtual Reality Laboratories Web Site

Researcher: Melvin Mattocks
Mentor: Paul Massel, ONR-NRL

The project assigned was to explore the depths of the Virtual Reality Laboratories web site and upgraded the site to reflect current events at the Information's Technology Division of Naval Research Laboratories. After gathering information for the separate topics of research, this information will be implemented into the information banks of the web site. Also incorporated will be graphical images of the equipment used and some insight on the equipment. Telling how it is used and how it is helpful in accomplishing the goals of the researchers that are fabricating it for use by governmental officials. After placing all of the files in the user directory, the beginning of the intensive make over had begun. It was the typical way of preparing a web page. The software used in completing this revision of the site was "jot"; using the programming languages "html" and a small taste of "JAVA";Finding backgrounds that seemed to compliment the text and the name of the page. Using graphics to enhanc or, make the site more attractive. There was also the use of a digital camera to take photos of the new research that had began at the laboratory. New research was also integrated into the site

19991019 030

EL NINO

Researcher: Kuchumbi Hayden
Mentor: Dr. Waldo Rodriguez
Center for Materials Research, NSU

A culmination of interactions between the ocean and the atmosphere, El Niño is the anomalous warming of the southward countercurrent of waters in the eastern equatorial Pacific Ocean, around the western coast of Peru and Ecuador. Normally, the water of this region is cold, rich in nutrients, and flows northward. The Southern Oscillation, a change in the surface pressure between the southeastern Pacific and the western Pacific Ocean, is closely associated with El Nino. Scientists give this relationship-the name ENSO, El Nino-Southern Oscillation.

Usually, the surface pressure in the southeastern Pacific is much higher than the pressure in the western Pacific Ocean. This difference in surface pressure creates a sharp pressure gradient which, facilitated by strong westward trade winds, carries water currents from east to west. These strong winds keep the warm waters in the west from flowing to the east. During El Nino, the difference in the surface pressure between the eastern and western Pacific Ocean decreases, thus diminishing the pressure gradient, and sometimes, even switching the regions of high and low pressure in the ocean. When the surface pressure of the western Pacific Ocean becomes higher than the surface pressure in the east, water currents move from the high pressure region to the low pressure region, from west to east. With the reduced pressure difference in the ocean come weaker trade winds that allow for the eastward movement of the water currents. The overall result is warmer than normal waters in the eastern Pacific, bringing about climatic differences both in areas around the Pacific Ocean and around the world. The worldwide effects of El Nino mark the importance of study and research in this area. The eastward shift of warm waters in the Pacific Ocean bring about increased precipitation in western parts of South America and the United States and droughts in the eastern parts of Asia and Australia. Adverse effects of El Nino due to increased precipitation and droughts include flooding, property damage, brush fires, and crop failures. Careful examination of the various aspects of El Nino will enable both a deeper understanding of this phenomenon and more effective measures to prevent disasters.

OZONE DEPLETION AND POLICY

Researcher: Lakisha Mundon
Mentor: Dr. Waldo Rodriguez
Center for Materials Research, NSU

The ozone layer is earth's primary protection from uvB rays. These ozone molecules are developed naturally under specific conditions in the stratosphere. Satellite data and other studies show that the ozone layer is decreasing overall and seasonally. The major sources of destruction of ozone molecules happen to be the use of CFCs and other ozone depleting chemicals and introducing them to the stratosphere. Decreasing ozone levels have a direct correlation with decreasing phytoplankton levels and increasing cases of skin cancer and development of cataracts. In response to these findings, environmental policies were development of cataracts. To these findings, environmental policies were developed and goals were used to curb alternating phases out of CFCs and other chemicals that break down ozone molecules. Looking at TOMS satellite data from 1978 -1993 Coastal Zone Color Scanner, skin cancer/cataract epidemiological breakdown and CFC phase out data were used to

determine the success of these policies and forecast the future for stratospheric ozone.

Analysis of aircraft measurements of cirrus cloud properties over the Tropical Western Pacific for a climate model experiment

Researcher: Alicia M. Jones
Mentor: Dr. Everette Joseph, Howard Univ.
Dept. of Physics and Atmospheric Science

The Great Climate Debate and Our Changing Climate are two articles that reflect the growing concern over the enhanced greenhouse effect (global warming) and how pollutants are harming our environment. It is believed that the anthropogenic increase of atmospheric trace gas concentrations, which has been occurring since the preindustrial period, is the primary cause of the observed increase in the global mean atmospheric temperature observed over the same period. Atmospheric scientists use global climate models to investigate this issue. The models, however, are limited in their ability to properly represent all the processes in the climate system, and thus produce results with many uncertainties. Cloud processes, particularly those of high clouds, are among the least understood and thus poorly represented processes in climate models.

This project is being conducted in support of research to improve the representation of high cirrus cloud infrared radiative properties in climate models. Specifically, cloud properties derived from aircraft measurements over the Tropical Western Pacific are processed and analyzed for a model validation experiment. The results of this experiment should provide further insight into the role of cirrus cloud in climate change.

ColdFusion Code (CFML) Project

Researcher: Joseph Gale
Mentor: Calvin Mackey
Goddard Space Flight Center

This project involved using ColdFusion code (CFML) to track media record in a database. The project was designed to provide a more efficient and user-friendly manner for the users on the various networks to track and manage records on various types of media. Accessing the targeted data involved connecting to an Informix database on a foreign server that did not have the application ColdFusion Server. The project also included installing programs to upgrade a Sun Ultra 10 system from Solaris 2.6 operating system to Solaris 2.7. The system was configured for jumpstart and sysid auto configuration, however the upgrade required disabling auto configuration on eosops setup.

Range Experiments Using a ND:YAG Micropulse Laser

Researcher: Santiel Creekmore
Mentor: Dr. Russel DeYonge
NASA Langley LIDAR Lab

This research effort involves the construction and testing of a tabletop 1.064m lidar system developed at Langley Research Center. The system consists of a VEM SW 1064 Microlaser by Litton Inc., an InGaAs detector, and an oscilloscope. The pulsed laser hit an aluminum plate at various distances from the laser. A lens near the detector collected the scattered light from the plate. The captured light was then focused onto an InGaAs optical detector. The output from the detector was measured by an oscilloscope, which

showed both the trigger laser pulse and the pulse scattered from the aluminum plate. The time difference between these pulses gives the total distance traveled by the laser pulse. Results were achieved for several ranging experiments conducted over a 3m range from the laser in increments of 0.3m.

Wake Votex/Aircraft Encounters

Researcher: Sheri Joyner
Mentor: Dr. Sonya Smith, Howard University

This project investigates the aerodynamic effects of wake vortex/aircraft encounters on ER-2 aircraft. A wake vortex is area of low-pressure turbulence that flows behind a moving object with a circular motion and tends to form a vaccum in its center as it draws subjects towards it. All aircraft form wake vortices when their winds are producing lift, which is derived from the difference of the low pressure on top of the wing and the high pressure on the bottom surface of the wing. We are concerned with the effect that the wake vortices have on aircraft during landing and takeoff as well as aircraft in flight.

This area of research is of great importance for several reasons; one being that airports are trying to maximize their capacity. In order to accomplish this air traffic controllers will have to reduce the spacing between each aircraft during take off and landing. Thus, there has to be a vortex hazard criterion developed to identify the location and strength of wake-vortices left behind by other aircraft. This vortex hazard criterion is required to ensure the safety of the airplanes, the pilots and the passengers from the training vortices. A part of this research will be to study mathematical models, which attempt to characterize vortex effects that are acceptable for operational use. These models are designed to take in consideration that atmospheric conditions, the vortex decay, the interactions of the vortex with the ground, and the clear air turbulence.

PDF Conversion

Researcher: Courtney Fields
Mentor: Mr. Will Gorman and
Mr. Eric Gabler
Federal Aviation Administration

This summer project involved converting Microsoft Word and Microsoft Excel files to pdf (portable document files) documents, so that each link would be compatible for an HTML file. The site upon which my research was based was the Department of Transportation FAA website, under the department of Airports, Program, and Planning 530. My duties included conducting research about airport files, comparing and contrasting airport locations with approved passenger facility charges, converting files, inserting new webpages and upgrading links to several webpages for the intranet Organizational Chart site. Other assignments included installing software for federal government employees, training on HTML, and briefing weekly to mentors and managers.

PHOTO HIGHLIGHTS ...

SEPTEMBER 2, 1999

The First Research
Training Meeting
for the Year !!!

Researchers:
Bailey, Bernard SO/JR
Banks, Katrina FR/CS
Brooks, Shayla FR/CS
Charity, Donald SR/MATH
Creekmore, Torreon FR/PHYSIC
Davis, Vincent FR/PHYSIC
Gale, Joseph JR/CS
Godwin, Katrina SR/CS
Harrison, Keisha JR/CS
Jones, Alicia SR/CS
Joyner, Kennethdra FR/CS
Joyner, Sheri SR/CS
Kaur, Ravinder JR//CS
Lassiter, Gregory SO/CS
Lassiter, Tina SO/CS
Mattocks, Melvin SO/CS
Mizelle, Angela JR/CS
Newby, Golar FR/CS
Powell, Je'aime JR/CS
Smith, Tarron So/CS
Williams, Gregory Jr. FR/CS
Williams, Jonathan JR/CS
Walker, Ernest JR/CS
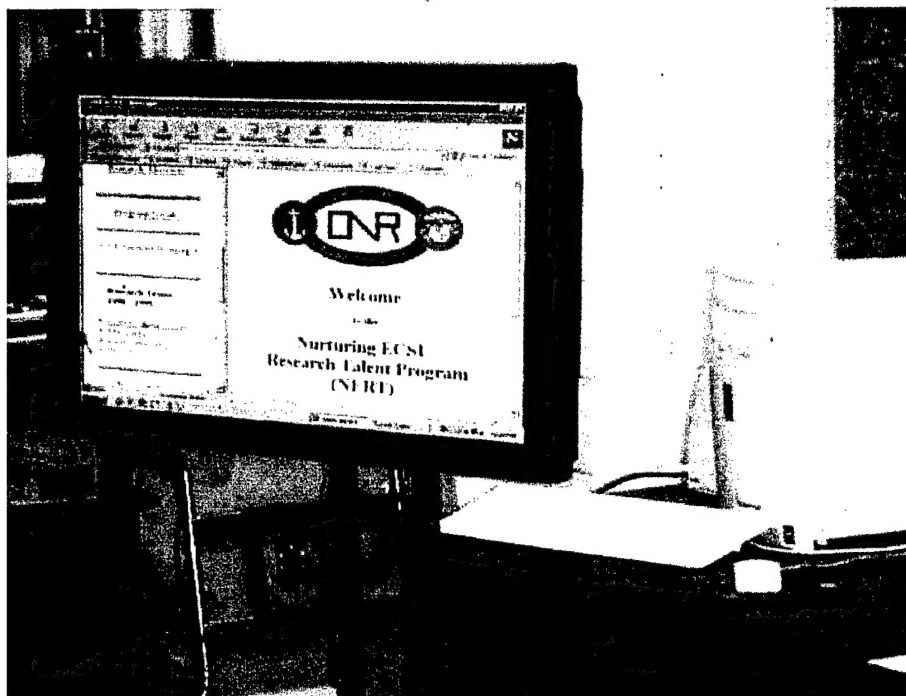
1999-2000 UNDERGRADUATE STUDENT RESEARCHERS

Seniors Shown: Donald Charity, Katrina Godwin, Sheri Joyner, Alicia Jones, Lakisha Mundon and Michael Pugh.

Juniors Shown: Joseph Gale, Angela Mizelle, Jonathan Williams and Je'aime Powell, Ravinder Kaur, Keisha Harrison and Ernest Walker.

Sophmores (shown left): Bernard Bailey, Tina Lassister, Gregory Lassiter, Melvin Mattocks
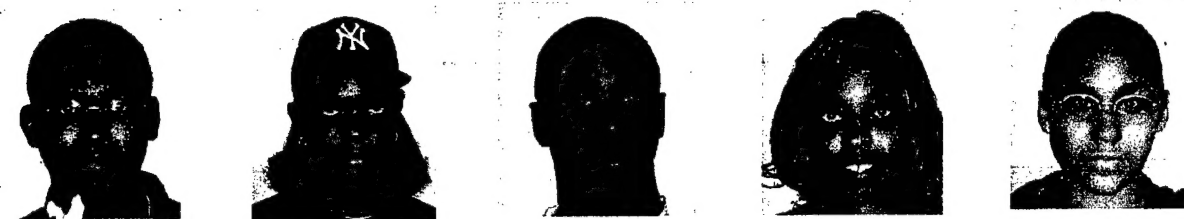
Freshmen Shown:

Golar Newby
Kennethdra Joyner
Torreon Creekmore
Katrina Banks

Shayla Brooks
Gregory Williams Jr.
Vincent Davis
Tarron Smith

Dr. Linda Bailey Hayden has been selected as one of the African American Women in Science and Technology to be featured in the Black Creativity 2000 Exhibition by the Chicago Museum of Science and Industry. Black Creativity is the largest celebration of its kind in the city of Chicago and the nation. Each year, approximately 70,000 people visit the exhibit during its run. The mission behind Black Creativity is to highlight the achievements and accomplishments of African Americans to the country and the world. This year, the museum will feature women in the scientific and industrial community. The exhibit is scheduled to run January 15, 2000 through March 5, 2000. Dr. Hayden serves as principal investigator for *The Nurturing ECSU Research Talent Program* funded by the Office of Naval Research.

Dates to Remember

❋ **ETS Graduate Record Examination Workshop Sept. 23-25, 1999.**

❋ **Computational Fluid Dynamics Applications on Parallel Computers Lecture by Dr. Kwai Lam Wong, Joint Institute for Computational Science, University of Tennessee. Dr. Johnny Houston, Coordinator. Sept. 23, 1999.**

❋ **Modifying and Using CGI Scripts Training Oct. 7, 1999.**

❋ **Celebration of Women in Mathematics Oct. 18, 1999.**

❋ **Internship Roundtable Oct. 26, 1999 2 - 3:30 pm 116 LH.**

❋ **ECSU Homecoming Oct. 30, 1999.**

❋ **LISA System Administration Conference Nov. 9-12, 1999.**

❋ **Focus 2000 Graduate School Focus Jan. 13 - 16, 2000.**

❋ **NAFEO High Tech Undergraduate Research Expo Feb. 17, 2000.**

❋ **Final Research Team Oral Reports April 6 and 11, 2000 5-6:30pm 116 Lester Hall.**

1999-2000 RESEARCH TEAMS ...

Team Name	Mentor(s)	Team Members
System Admin	Dr. Pandharkar Mrs. M. Koltuniak	Tina Lassiter So/CS Bernard Bailey So/Tech Katrina Banks Fr/CS Shayla Brooks Fr/CS Melvin Mattock So/CS Ernest Walker Jr/CS Gregory Williams Fr/CS Golar Newby Fr/CS
Visualization	Dr. Kossi Edoh	Revindar Kaur Jr/CS Keisha Harrison Jr/CS Kennethdra Joyner Fr/CS
Statistics	Dr. V. Manglik	Lakisha Mundon Sr/Math
Networks	Mr. R. Harris Dr. L. Hayden	Joseph Gale Jr/CS Gregory Lassiter So/CS Sheri Joyner Sr/CS Katrina Godwin Sr/CS Donald Charity Sr/CS
Physics	Dr. L. Choudhury	Torreon Creekmore Fr/Phy Alicia Jones Sr/CS Vincent Davis Fr/Phy Michael Pugh Sr/Phy
Multimedia	Mr. J. Wood Dr. L. Hayden	Jonathan Williams, Jr/CS Je'aime Powell, Jr/CS Angela Mizzell JrCS Tarron Smith So/CS

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